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EXAMINER

CALLAWAY, JADE R

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/582,818	Applicant(s) CABLE ET AL.	
	Examiner JADE R. CALLAWAY	Art Unit 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 October 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) 11-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The amendments to the claims, in the submission dated 10/2/09, are acknowledged and accepted.

Response to Arguments

2. Applicant's arguments with respect to claims 1-10 have been considered but are moot in view of the new ground(s) of rejection.

Election/Restrictions

3. Newly submitted claims 11-17 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:
 - I. Claims 1-10, drawn to a holographic display device and method comprising a phase mask that has a resolution higher than a predetermined resolution of the holographic display device or the phase mask is arranged so that respective locations where pixels of the phase mask meet are disposed above generally central regions of the pixels of the display device, classified in class 359, subclass 32.
 - II. Claims 11-17, drawn to a method and apparatus for displaying a holographically generated image wherein a SLM and pixellated phase mask are configured such that when an image is replayed by the hologram each pixel of the hologram is modified by at least two pixels of the pixellated phase mask, classified in class 359, subclass 11.

Art Unit: 2872

The inventions are distinct, each from the other because of the following reasons:

4. Inventions I and II are directed to related products. The related inventions are distinct if: (1) the inventions as claimed are either not capable of use together or can have a materially different design, mode of operation, function, or effect; (2) the inventions do not overlap in scope, i.e., are mutually exclusive; and (3) the inventions as claimed are not obvious variants. See MPEP § 806.05(j). In the instant case, the inventions as claimed have a materially different design, mode of operation and function. Furthermore, the inventions as claimed do not encompass overlapping subject matter and there is nothing of record to show them to be obvious variants.

5. Restriction for examination purposes as indicated is proper because all these inventions listed in this action are independent or distinct for the reasons given above and there would be a serious search and examination burden if restriction were not required because one or more of the following reasons apply:

- (a) the inventions have acquired a separate status in the art in view of their different classification;
- (b) the inventions have acquired a separate status in the art due to their recognized divergent subject matter;
- (c) the inventions require a different field of search (for example, searching different classes/subclasses or electronic resources, or employing different search queries);
- (d) the prior art applicable to one invention would not likely be applicable to another invention;

(e) the inventions are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 11-17 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Objections

6. Claim 10 is objected to because the abbreviation “OSPR” is not defined in the claim. Appropriate correction is required.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claim 7 is rejected under 35 U.S.C. 102(b) as being anticipated by Kasazumi et al. (EP 0450644 A2) of record.

Consider claim 7, Kasazumi et al. teach (e.g. figures 3a-3c) a method of increasing the viewing angle of a hologram on a pixellated hologram display device having a predetermined resolution, the method comprising disposing a pixellated phase mask (200, diffuser) with respect to the pixellated hologram display device (300, liquid crystal device) for viewing the hologram, wherein the resolution of the pixellated phase

Art Unit: 2872

mask is greater than that of the pixellated hologram display device (there are 9 pixels in the phase mask for every one pixel on the SLM device) [pg. 5, lines 3-55].

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kasazumi et al. (EP 0450644 A2) of record, in view of Hesselink et al. (5,995,251) (of record).

Consider claim 8, Kasazumi et al. disclose (e.g. figures 3a-3c) a method of viewing a pixellated hologram, the pixels of the hologram (e.g. 391, pixels of the liquid crystal device) having a predetermined resolution, comprising holograms and a pixellated phase mask (200, diffuser), wherein the resolution of the pixellated phase mask is greater than that of the pixellated hologram (there are 9 pixels in the phase mask for every one pixel on the SLM device) [pg. 5, lines 3-55]. However, Kasazumi et al. do not disclose that the holograms displayed on the SLM are viewed through the phase mask. Kasazumi et al. and Hesselink et al. are related as holographic devices. Hesselink et al. teach (e.g. figures 1-2) a device wherein holograms displayed on the SLM (20) are viewed through the phase mask (29) [col. 4, lines 6-18]. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the location of the phase mask in relation to the SLM of Kasazumi et al., as

Art Unit: 2872

taught by Hesselink et al., in order to facilitate adhesion and increase the bonding area of a phase mask with differing phase levels to the SLM.

11. Claims 1-6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kasazumi et al. (EP 0450644 A2) of record, in view of Hesselink et al. (5,995,251) of record, and Waldern et al. (2004//0108971).

Consider claim 1, Kasazumi et al. disclose (e.g. figures 3a-3c) a holographic display comprising a spatial light modulator (300, liquid crystal device) and a pixellated hologram display device having a predetermined resolution and a pixellated phase mask (200, diffuser) arranged such that images are displayed on the SLM (300, liquid crystal device), wherein the phase mask has a resolution higher than the predetermined resolution (there are 9 pixels in the phase mask for every one pixel on the SLM device) [pg. 5, lines 3-35]. However, Kasazumi et al. do not disclose that the spatial light modulator provides a pixellated hologram device having a predetermined resolution such that holograms displayed on the SLM are viewed through the phase mask. Kasazumi et al. and Waldern et al. are related as holographic devices. Waldern et al. teach (e.g. figures 10-11) a spatial light modulator (200, composite of holographic layers 201 containing holographic elements 202) that provides a pixellated hologram device having a predetermined resolution such that holograms are displayed on the SLM (holograms are recorded such that when illuminated by reference light holograms are displayed on the composite layers) [0098-0109]. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the device of Kasazumi et al., as taught by Waldern et al., so that the display has a high

Art Unit: 2872

resolution, high diffraction efficiency and is capable of implementing non-planar geometries.

However, the modified Kasazumi et al. reference does not disclose that the holographic images are viewed through phase mask. Kasazumi et al., Waldern et al. and Hesselink et al. are related as holographic devices. Hesselink et al. teach (e.g. figures 1-2) a device wherein holograms displayed on the SLM (20) are viewed through the phase mask (29) [col. 4, lines 6-18]. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the location of the phase mask in relation to the SLM of the modified Kasazumi et al. reference, as taught by Hesselink et al., in order to facilitate adhesion and increase the bonding area of a phase mask with differing phase levels to the SLM.

Consider claim 2, Kasazumi et al. disclose (e.g. figures 3a-3c) a holographic display comprising a spatial light modulator (300, liquid crystal device) and a pixellated hologram display device having a predetermined resolution and a pixellated phase mask (200, diffuser) arranged such that images are displayed on the SLM (300, liquid crystal device), wherein the phase mask co-operates with the SLM such that a repeating pattern of holographic elements (the phase mask imparts a repeating phase shift pattern of $\pi/2$ onto the SLM device) has a higher resolution than the predetermined resolution (there are 9 pixels in the phase mask for every one pixel on the SLM device) [pg. 5, lines 3-35]. However, Kasazumi et al. do not disclose that the spatial light modulator provides a pixellated hologram device having a predetermined resolution such that holograms displayed on the SLM are viewed through the phase mask.

Art Unit: 2872

Kasazumi et al. and Waldern et al. are related as holographic devices. Waldern et al. teach (e.g. figures 10-11) a spatial light modulator (200, composite of holographic layers 201 containing holographic elements 202) that provides a pixellated hologram device having a predetermined resolution such that holograms are displayed on the SLM (holograms are recorded such that when illuminated by reference light holograms are displayed on the composite layers) [0098-0109]. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the device of Kasazumi et al., as taught by Waldern et al., so that the display has a high resolution, high diffraction efficiency and is capable of implementing non-planar geometries.

However, the modified Kasazumi et al. reference does not disclose that the holographic images are viewed through phase mask. Kasazumi et al., Waldern et al. and Hesselink et al. are related as holographic devices. Hesselink et al. teach (e.g. figures 1-2) a device wherein holograms displayed on the SLM (20) are viewed through the phase mask (29) [col. 4, lines 6-18]. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the location of the phase mask in relation to the SLM of Kasazumi et al., as taught by Hesselink et al., in order to facilitate adhesion and increase the bonding area of a phase mask with differing phase levels to the SLM.

Consider claim 3, Kasazumi et al. disclose (e.g. figures 3a-3c) a holographic display wherein the pixellated hologram display device is arranged to display binary

Art Unit: 2872

phase holograms and the phase mask has four phase levels (e.g. 0, $\pi/2$, π , $3\pi/2$) [pg. 5, lines 18-55].

Consider claim 4, Kasazumi et al. disclose (e.g. figures 3a-3c) a holographic display device wherein the display is constructed and arranged to operate at a given optical wavelength (wavelength at which the device operates), and taking one of the phase levels as a reference (e.g. the zero phase level), the others provide respective phase shifts of $\pi/2$, π , $3\pi/2$ at the given wavelength [pg. 5, lines 18-26].

Consider claim 5, Kasazumi et al. disclose (e.g. figures 3a-3c) a holographic display device wherein the hologram display device is arranged to display four phase holograms (e.g. 0, $\pi/2$, π , $3\pi/2$) and the phase mask has two phase-levels (at least two phase-levels are disclosed) [pg. 5, lines 18-55].

Consider claim 6, Kasazumi et al. disclose (e.g. figures 3a-3c and 5) a holographic display device wherein the hologram display device comprises an SLM (1, liquid crystal SLM) [pg. 5, lines 18-55 of Kasazumi et al. and 0001 of Waldern et al.].

Consider claim 9, Kasazumi et al. disclose (e.g. figures 3a-3c) a holographic display comprising a spatial light modulator (300, liquid crystal device) and a pixellated hologram display device having a predetermined resolution and a pixellated phase mask (200, diffuser) arranged such that images are displayed on the SLM, wherein the phase mask is arranged so that the respective location where its pixels meet are disposed above (i.e. the phase mask is arranged optically above or on the side of incidence with respect to the SLM device) generally central regions of the pixels of the display device (e.g. 391, pixels of the liquid crystal device) [pg. 5, lines 3-55]. However,

Art Unit: 2872

Kasazumi et al. do not disclose that the spatial light modulator provides a pixellated hologram device having a predetermined resolution such that holograms displayed on the SLM are viewed through the phase mask. Kasazumi et al. and Waldern et al. are related as holographic devices. Waldern et al. teach (e.g. figures 10-11) a spatial light modulator (200, composite of holographic layers 201 containing holographic elements 202) that provides a pixellated hologram device having a predetermined resolution such that holograms are displayed on the SLM (holograms are recorded such that when illuminated by reference light holograms are displayed on the composite layers) [0098-0109]. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the device of Kasazumi et al., as taught by Waldern et al., so that the display has a high resolution, high diffraction efficiency and is capable of implementing non-planar geometries.

However, the modified Kasazumi et al. reference does not disclose that the holographic images are viewed through phase mask. Kasazumi et al., Waldern et al. and Hesselink et al. are related as holographic devices. Hesselink et al. teach (e.g. figures 1-2) a device wherein holograms displayed on the SLM (20) are viewed through the phase mask (29) [col. 4, lines 6-18]. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the location of the phase mask in relation to the SLM of Kasazumi et al., as taught by Hesselink et al., in order to facilitate adhesion and increase the bonding area of a phase mask with differing phase levels to the SLM.

Consider claim 10, the modified Kasazumi et al. reference discloses (e.g. figures 10-11 of Waldern et al.) a holographic display device configured to calculate holograms for display on the SLM (200, composite) by an OSPR-type method (e.g. rapid calculation of holograms for a scene) in which noise in the replay image is reduced by displaying a plurality of holograms per image frame (switching times are in the region of 1 to 10 micro seconds and include a plurality of pixel holograms per image frame, i.e. each composite layer) [0101-0107 of Waldern et al.].

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JADE R. CALLAWAY whose telephone number is

Art Unit: 2872

(571)272-8199. The examiner can normally be reached on Monday to Friday 6:00 am - 3:30 pm est.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephone B. Allen can be reached on 571-272-2434. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JRC
/JADE R. CALLAWAY/
Examiner, Art Unit 2872

/Arnel C. Lavarias/
Primary Examiner, Art Unit 2872